River. The three CSOs drain the Bergen Avenue, Tappan Street, and Dukes Street CSO districts.

Newark Reach

The Newark Reach extends from Station 181+00 to Station 258+00 of the Passaic River Study Area and runs through the downtown section of the City of Newark. This Reach of the Passaic River begins in an east-west direction and slowly curves in a northerly direction.

The Newark Reach contains numerous bridges. Looking upstream the bridges include: the Jackson Street Bridge, the Amtrak Railroad Bridge, the Harrison Ave. Bridge, a Conrail freight railroad bridge, the William Stickel Memorial Bridge, and the Clay St. Bridge which delineates the upstream extent of the Newark Reach. The Center St. Bridge was located between the Amtrak and Harrison Avenue Bridges, however, this bridge has since been abandoned and the bridge piers removed.

The USACE has designated the Project Limits as 300 feet wide in the Newark Reach with a Project Depth of 20 feet (MLW). The only dredging within the period of interest (1940 to present) was performed in 1949. The dredging at that time was to a project depth of 16 feet. The last hydrographic survey was performed in 1989. Based on the 1989 survey, channel depths in this reach range from 19.2 feet (MLW) at the downstream end to 18.7 feet (MLW) at the upstream end.

The right shoreline consists of wooden, metal, or stone bulkheads bordered by oil storage tanks and numerous small manufacturing facilities and a former coal burning facility near the Jackson St. Bridge. The left shoreline consists of wooden and stone bulkheads bordered by a small park along side Highway 52 (fenced on the river side), and parking lots.

The Newark Reach contains a total of eleven direct CSOs discharging into the Passaic River. In upstream order, the CSOs are: the Jackson Street CSO on the left bank at Station 183+00; the City Dock CSO on the left bank at Station 200+00; the Saybrook Place CSO on the left bank at 217+00; the Middlesex Street CSO on the right bank at Station 219+00; the Rector Place CSO on the left bank at Station 224+00; the Bergen Street CSO on the right bank at Station 226+00; the Dey St CSO on the right bank at Station 230+00; the Bridge Street and Harrison Avenue CSOs on the left and right bank respectively, both at Station 235+00; the Orange Street and Cleveland Avenue CSOs on the left and right bank respectively both at Station 240+00; and the New Street CSO on the right bank at Station 245+00.

Kearny Reach

The Kearny Reach extends from approximately Station 258+00 to 310+00 in the Passaic River Study Area. The Reach begins in a general north-south direction and then curves to the northeast. The Reach contains two bridges; the aforementioned Clay St. Bridge that delineates the boundary between the Newark and Kearny Reaches and a former Erie & Lackawanna Railroad bridge. The railroad bridge is abandoned and maintained in the open position.

The USACE has designated the Project Limits for the Kearny Reach as 300 feet wide with a Project Depth of 20 feet. The only dredging in the period of interest (1940 to present) was performed in 1949 to a then Project Depth of 16 feet. Based on the 1989 hydrographic survey, channel depths range from 18.7 feet (MLW) at the downstream end of the Reach to 17.0 feet (MLW) at the upstream end.

The left shoreline consists primarily of stone bulkheads and is bordered by train tracks serviced by ConRail and 4-lane Highway 22 (McCarter Freeway) leading northward from downtown Newark. The ConRail rail lines end at the site of the former PPG

manufacturing plant located along the left shore of Kearny Reach. The right shore of the Kearny Reach consists of wooden and stone bulkheads bordered by several small manufacturing facilities.

The Kearny Reach contains a total of six CSOs discharging into the Passaic River. The Clay Street and Central Avenue CSO are on the left and right bank respectively at Station 259+00; the Passaic Street CSO is on the left bank at Station 265+00; the Johnston Avenue CSO is on the right bank at Station 271+00; the Fourth Ave CSO is on the left bank at Station 279+00; the Oriental Street CSO is on the left bank at Station 285+00; the Nairn Avenue CSO is on the right bank at Station 289+00; and the Bergen Street CSO discharges from the right bank at Station 306+00.

Arlington Reach

Only a small portion of the Arlington Reach is in the Passaic River Study Area. The Arlington Reach extends from Station 310+00 beyond the upstream extent of the Passaic River Study Area at Station 316+80. The river direction does not change appreciably in the Arlington Reach.

The USACE has delineated the Project Limits as 200 feet wide in the Arlington Reach with a Project Depth of 16 feet (MLW). The dredging of this Reach in the period of interest occurred in 1949 and was completed to the Project a Depth of 16 feet (MLW). Based on the 1989 hydrographic survey, the channel depth in the Passaic River Study Area portion of the Reach is 17.0 feet (MLW).

The right shoreline of the Arlington Reach consists of wooden and stone bulkheads bordered by several small manufacturing facilities and some private homes at the northern end of the Passaic River Study Area. The left shore of the Arlington Reach consists primarily of parking lots.

The Passaic River Study Area within the Arlington Reach contains only one CSO. The Herbert Avenue CSO discharges into the river from the right bank at Station 315+00. There are two other CSOs that are serviced by the Passaic Valley Sewerage Commission (PVSC) that discharge into the Passaic River upstream from the Passaic River Study Area but whose discharge may influence material within the Study Area the Delavan Avenue and Verona Avenue CSOs.

2.2 SITE HISTORY

2.2.1 History of Contamination

During the past two centuries, the Site has been subject to multiple influences and changes due to natural hydrological, topographical, climatological and ecological conditions. However, of greater significance were changes due to rapidly expanding urban and industrial development in the region. Available information indicates that historical pollutant loadings throughout the 1900s have had a substantial impact on the ecological conditions of the Site, as well as the Newark Bay estuary (McCormick and Quinn 1975; Earll 1887; Mytelka et al. 1981; Esser 1982; Squires 1981; and Hurley 1992).

Degradation of water quality in the lower Passaic River, including the Site, first became apparent during the Civil War (Brydon 1974; Cunningham 1966b). In 1873, coal tar residues suspended in the river water were noted (Brydon 1974). The deteriorating water quality of the lower Passaic River during this period forced many residents to dig their own wells; by 1885 however, a survey showed that seventy-five percent of groundwater wells also were polluted (Cunningham 1966b). Between 1884 and 1890, over 1,000 of Newark's more than 1,500 wells had been closed due to contamination (Galishoff 1988). In 1887, an inspector for the Passaic River declared that legal action would be required to mitigate pollution of the river from industrial waste practices (Brydon 1974). In 1894, as much as one third of the total flow of the Passaic River was

estimated to be sewage (Brydon 1974). In 1910, the mouth of the Passaic River was declared to be ?black from the sewage and manufacturing wastes it receives" (Mytelka et al. 1981).

The growing population of Newark during the first half of the twentieth century resulted in the generation of increasing volumes of human wastes, resulting in a characterization of the lower Passaic River as an open sewer (Suszkowski et al. 1990). Efforts to improve the water quality and to reduce the spread of disease of the Passaic River led to the construction of a trunk sewer line system in 1924 (Brydon 1974). In addition, despite the development of sewage treatment plants, many industrial facilities located along the Passaic River were not connected to the Passaic Valley Sewage Commission trunk line until the late 1950s (Brydon 1974).

During the 1980s and early 1990s, several investigations were conducted to evaluate the concentrations of various potential contaminants in sediments within the Site boundaries. These studies include investigations conducted as part of the remedial investigation work at the Diamond Alkali Superfund Site, investigations conducted by Maxus on behalf of OCC in the early 1990s, and investigations conducted by various governmental agencies including National Oceanic and Atmospheric Administration (NOAA), the US Fish and Wildlife Service (USFWS), and EPA. These investigations indicated that sediments of the Passaic River Study Area contain elevated concentrations of numerous hazardous substances including, but not limited to, cadmium, copper, lead, mercury, nickel, zinc, bis(2-ethylhexyl)phthalate, polynucleararomatic hydrocarbons, polychlorinated biphenyls (PCBs), 4,4'-dichlorodiphenyltrichloroethane (4,4'-DDT), diesel range organics (Total Extractable Petroleum Hydrocarbons), polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans, and chlorinated herbicides and phenols (Huntley, 1993; Bonnevie, 1993; Gillis, 1993; Wenning, 1993; Bonnevie, 1992; Bonnevie, 1994; Wenning, 1994).